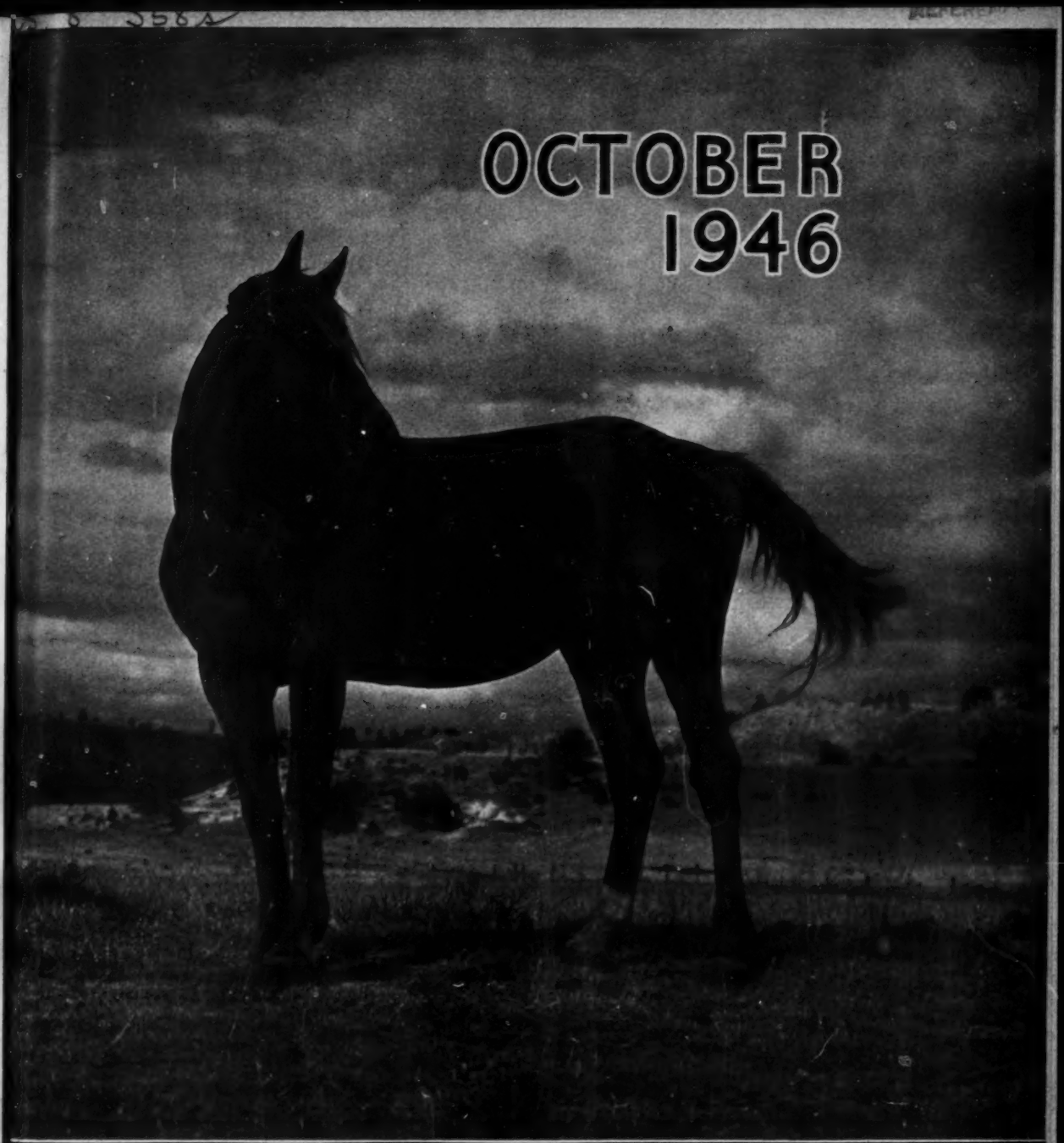

OCTOBER
1946

SOIL CONSERVATION

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SOIL CONSERVATION

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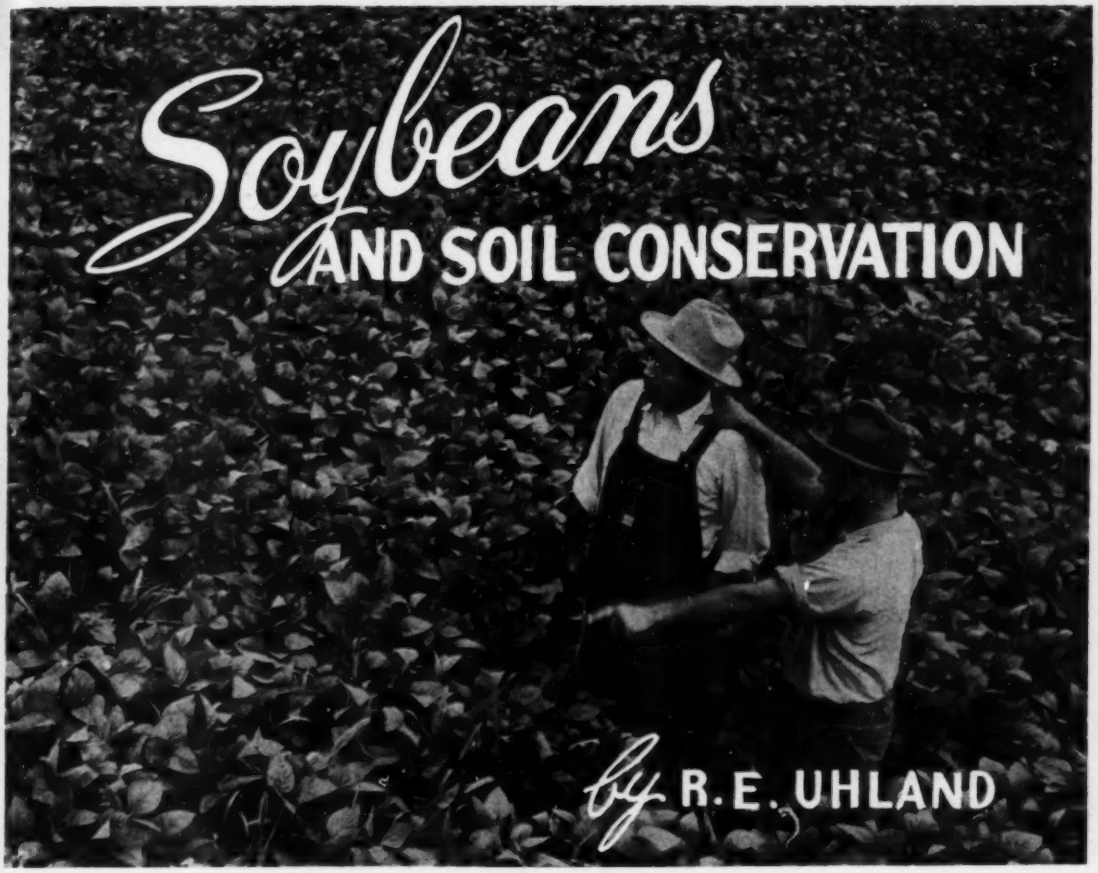
Front cover: Ranch horses like this one seen on the range near Lame Deer, Mont., develop their intelligence, beauty, and stamina on good grass—not in dust bowls. (Photo by courtesy Farm Security Administration.)

SOIL CONSERVATION is issued monthly by Soil Conservation Service of the United States Department of Agriculture, Washington, D. C. The matter contained herein is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with the approval of the Director of the Budget. SOIL CONSERVATION seeks to supply to workers of the Department of Agriculture engaged in soil conservation activities, information of special help to them in the performance of their duties. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 10 cents a copy, or by subscription at the rate of $1.00 per year, domestic; $1.50 per year foreign. Postage stamps will not be accepted in payment.



Drilled soybeans give good protection against erosion at this stage of growth.

SOYBEANS may be handled so as actually to help in maintaining the productivity of the soil, whether grown for hay or for seed.

When soybean hay is fed and the manure spread back on the land, about 70 percent of the hay's plant nutrients is returned. Little consideration has been given, however, to the plant nutrients contained in the soybean leaves, stems, and roots, or to the protection they can give to the soil against erosion if returned to the soil when the crop is harvested for seed. Growers, therefore, should be concerned with returning to the land as much of the nitrogen gathered from the air and as much as possible of the mineral matter taken from the soil.

Early investigational work on the analysis and yields of the different plant parts were carried on by the author at the Missouri Agricultural Experiment Station, and by H. L. Borst and L. E. Thatcher at the Ohio State Agricultural Experiment Station. The findings are reported in Missouri Agricultural Experiment Station Bulletin 279—February 1930, and Ohio Agricultural Experiment Station Bulletin 474—November 1931. The analysis reported covers 4 years' work at Missouri and 6 years' work at Ohio. The data given supply us with a good basis for determining the value of different parts of the soybean plant when returned to the land.

Soybean varieties differ widely in time of maturity, character of stem and leaf, and adaptation to length of season. Some varieties have numerous branches, others few. The Missouri studies

NOTE.—The author is research specialist, Soil Conservation Service, Washington 25, D. C.

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No contouring, too many successive crops of soybeans—disaster!

were continued from 1925–28, with the Virginia variety grown on two different types of soil. The studies at Ohio—made on the Manchu and Peking varieties—were started in 1922 and continued until 1927, but were not reported until November 1931.

The nitrogen determinations made on the various parts of the plants harvested at different stages of maturity made it possible to measure the total yield of nitrogen for the different harvests and also to determine its location in the plant. The nodule counts and root analyses gave an index of the nitrogen-fixing activities of the crop. As indicated by table 1, the amount of nitrogen found in the roots was quite low, averaging less than 4 pounds per acre. This indicates that if much nitrogen is to be added to the soil, it is necessary to return more than just the soybean roots. Cutting the hay at time of maximum harvest would have removed 115.7 pounds of nitrogen per acre. At the last harvest, when the seed was mature, most of the leaves had fallen, and they had lost some of their nitrogen. If the beans had been harvested with a combine there would have been from 40 to 45 pounds of nitrogen returned. The maximum yield of nitrogen in the tops for 1928 was 134 pounds per acre when drilled solid, and 101 pounds for soybeans planted in rows and cultivated. In 1927 when soybeans were grown as a catch crop, the hay contained 57.2 pounds of nitrogen when drilled solid, and 35.8 pounds when cultivated.

Table 1.—Pounds per acre of nitrogen in roots, leaves on plant and on ground, stems, and pods of Virginia soybeans at different stages of maturity. (2 years' results at Columbia, Mo.)

Stage of maturity	Roots	Leaves on—		Stems	Pods	Total plants
		Plant	Ground			
4 weeks before maximum harvest	2.6	45.2	.....	14.2	.....	62.0
2 weeks before maximum harvest	3.8	58.5	.....	23.7	24.6	110.6
Maximum harvest	3.7	31.1	19.1	19.2	46.3	119.4
2 weeks after maximum harvest	2.4	13.7	17.6	16.3	57.1	107.1
4 weeks after maximum harvest	2.2	6.3	14.8	13.3	69.9	106.5

Assuming that all the nitrogen contained in the dropped leaves would have been returned to the soil and that 70 percent of the nitrogen in the

When C. A. Van Doren cut these soybeans for hay little residue remained to guard the soil against erosion.

Lessened erosion, increased yields, from contoured rows.

Soybean residue, left on surface, protects against erosion.

harvest hay would have been returned in the manure, there would have been a return to the soil of 71.8 pounds in the cultivated crop of 1925, 107.5 pounds in 1926, and 93.8 pounds in 1928. It was calculated that slightly more than half of this nitrogen came from the air. By combining the soybeans for seed, it was estimated that there would have been a return of 51 pounds of nitrogen in 1925, 67.5 pounds in 1926, and 63.5 pounds in 1928.

The investigations of H. L. Borst and L. E. Thatcher at Ohio showed that earlier sowing dates for the Manchu and Peking varieties were more conducive to higher yields of seed than of forage. Hughes and Wilkins at the Iowa station at Ames reported similar findings. Table 2 shows the average pounds per acre of the principal plant nutrients found in the soybean leaves, stems, pods, and seeds for the Manchu and Peking varieties. Maximum yields of nitrogen were obtained while the seeds were forming in the pods and before many leaves were lost. As was the case at Missouri, the nitrogen in the stems and leaves decreased rapidly as the plants matured. Part of this decrease was due to the movement of nitrogen from the stems and leaves into the seed while the rest was returned to the soil. The data shown in

table 2 were secured when the soybean plants had matured and when more than 45 percent of the nitrogen was in the seed.

Table 2.—Pounds per acre of principal plant nutrients found in leaves, stems, pods, and seeds of Manchu and Peking soybeans. (Average for 2 varieties for 4 years at Ohio Agricultural Experiment Station)

Plant nutrients	Leaves	Stems	Pods	Seeds	Total tops
Calcium	57. 5	14. 6	11. 4	2. 2	85. 7
Magnesium	25. 2	12. 1	6. 5	2. 3	46. 0
Potassium	29. 3	16. 2	15. 7	18. 6	79. 8
Phosphorus	7. 3	3. 3	2. 6	9. 8	22. 9
Nitrogen	55. 3	17. 6	21. 8	78. 5	173. 1
Dry weight plant parts	2, 333	1, 655	1, 046	1, 046	6, 080

At maturity, if only the seed had been harvested, about 94.5 pounds of nitrogen would have been returned to the soil. If all the hay and seed had been taken off the land, it would have represented the removal of 85.7 pounds of calcium, 46 pounds of magnesium, 79.8 pounds of potassium, 22.9 pounds of phosphorus, and 173.1 pounds of nitrogen per acre. If only the seed had been harvested, however, the average losses would have been 2.2 pounds of calcium, 2.3 pounds of magnesium, 18.6 pounds of potassium, 9.8 pounds of phosphorus, and 78.5 pounds of nitrogen. This emphasises the loss, especially of nitrogen and organic matter, when the soybean straw is burned or is not returned to the land.

L. E. Thatcher, of Ohio, found that for 6 years, soybeans cut about the middle of September contained 7 pounds of nitrogen per acre in the roots, as compared with 4.9 pounds when harvest was delayed until the first week of October. At the September harvest, 39.1 pounds of nitrogen per acre was in the leaves, 14.7 pounds in the stems, 12.6 pounds in the pods, and 51.6 pounds in the seeds. When the harvest was delayed 2 weeks, 19.7 pounds of nitrogen was found in the leaves, 9.9 pounds in the stems, 10.1 pounds in the pods, and 72.1 pounds in the seeds. It is apparent that much of the nitrogen moves from the stems and leaves into the seeds. It is difficult to determine the extent of this movement, because of leaf-dropping as the soybeans approach maturity. The 6-year average showed that the amount of phosphorus removed by the crop harvested in either middle September or the first of October was 30 pounds of P_2O_5, equivalent to 150 pounds of 20-percent superphosphate. The amount of potassium removed by the crop on these two harvest dates was 39 to 41 pounds of K_2O, equivalent to 78 to 82 pounds of muriate of potash.

It is generally recognized that a crop of soybeans leaves the soil loose. Observations and experiments have shown that the soil erodes easily following the removal of the crop, especially, when it is cut for hay. C. H. Van Doren and R. S. Stauffer reported on the effects of crop and surface mulches on run-off and soil losses on a 4-percent slope at Urbana, Ill., in volume VIII of Soil Science of America in 1943. The experiments showed that when artificial rainfall was applied to clean-cultivated soybeans at the rate of 1.75 inches per hour on a 4-percent slope, the run-off was practically constant after the second hour. The run-off at the end of the first hour in April 1942 was 74 percent and in June 1942 was 85 percent. The soil loss for the first hour in April 1942 was 3,362 pounds per acre, and in June 1942 it was 4,881 pounds. At the end of 2 hours, 10,383 pounds of soil per acre had been moved off the plot, and 89 percent of the 1.75 inches of rainfall was running off.

Where the soybean residue consisting of all the plants except the seed was returned to the surface, the run-off at the end of the first hour for October 1941 was 47 percent, and at the end of the second hour it was 62 percent. In April 1942, the run-off was 25 percent at the end of 1 hour and 47 percent after the second hour. The soil loss for October 1942 was 1,168 pounds per acre for the 2-hour period, and in 1942 it was 2,394 pounds. Thus, it is seen that the soil loss for October where the soybean residue was returned was only 11.2 percent as great as where the residue was not returned. The residue was still active the next April, as the soil loss was 23 percent of the soil loss without the residue.

Use of early maturing varieties allow for early harvesting of the soybeans and the seeding of winter grains or cover crops earlier than is possible with late maturing varieties. Winter cover crops which have a week or more advantage, when conditions are favorable for rapid germination and growth, will generally produce much more organic matter and give better protection to the land. Late planted cover crops cannot be expected to give much protection against erosion in the fall and winter, and their growth the next spring is much behind those crops that have an early start and thus establish a well-developed

(Continued on page 59)

The Church IN RURAL RECONSTRUCTION

by EUGENE SMATHERS

WHEREVER man denies his stewardship of the soil and despoils the earth, the church is called upon to reclaim judgment, in the name of God, and preach repentance as the only way to reconstruction and renewal. And, positively, through the whole range of its program of worship and teaching, it should seek to develop an understanding and love of the land as God's most precious material gift, "A land which the Lord thy God careth for: the eyes of the Lord thy God are always upon it, from the beginning of the year even unto the end of the year." (Deut. 11:12.) The church should help its people, especially these on the land, to see the scientific principles of good land use as the laws of God, and to understand that the scientist, who humbly and honestly seeks to discover and apply these laws, these ways of God revealed in the very structure of the physical universe, is acting in harmony with the petition: "Thy will be done." This implies that the church and its leadership should gain an understanding of the programs of the various agencies working for the restoration, conservation, and enrichment of the soil, and become a champion of such programs in the local situation, encouraging its members to participate, such participation being one effective means of exercising their stewardship. Only as the church is able to motivate its members to cooperate in these action programs can the principles of its faith become operative in our daily affairs. God works for the reconstruction of His world and for the well-being of man through other than ecclesiastical channels.

There is growing awareness in the church that poor land means poor people, poor not only economically but in all of the ranges of human experience. Eroded, wasted soils mean weak, inadequate institutions, of which the church is one. T. S. Buie, on the basis of a study of a group of churches in South Carolina, has provided a concrete illustration of the close relationship between the adequacy of church programs and the condition of the soil. The greater the erosion, the lower the soil fertility, the less effective were the churches. So from the point of view of its basic faith and also as a matter of soil preservation, the church has a stake in the soil.

* * *

The church should experiment with means and methods of improving land tenure practices, at the local level, and for helping young families become established on farms of their own. The National Catholic Rural Life Conference, the Town and County Committee of the Protestant Churches, and the Jewish Agricultural Society are working on these problems. The Church of the Brethren has established a land purchase fund from which, upon the recommendation of the pastor and officers of a local church, a young couple may secure assistance in the purchase of a farm. Other denominations are working on similar plans. The Church of the Latter Day Saints has made family settlement a traditional policy. Some of us believe that the denominational boards, which now have thousands of dollars invested in stocks and bonds, could well invest some of this money in land, and thereby both receive a return on their investment and make an investment in new families on the land. There is

NOTE.—The author is secretary, Friends of the Soil, Black Lick, Tenn. His article is taken from a paper presented at the Fifth Annual Conference on Conservation, Nutrition, and Human Health, Athens, Ohio.

much which local churches can do even though they do not have a special plan or fund for helping families secure land.

Calvin Schnucker, while pastor at Titonka, Iowa, was able during a period of 6 years to lift the percentage of owner-operated farms within his parish from 34 to 60 percent. He began by preaching on farming as a way of life, the need for thrift if a young couple were to become owners, the need for scientific training in the successful operation of a farm. While trying to get these ideas across to his young people, he surveyed his parish to determine what lands were for sale. Then he went over these available farms with the county agent to determine whether the price was in line with productive capacity. Finally, when a young man had saved something to apply on the purchase price, his pastor took him to the banker and county agent for advice in selecting a farm. The pastor's recommendation made it possible for the young man to secure more generous credit terms than might otherwise have been possible. In this rather informal way and without the investment of money, one church was able to change the tenure situation within its parish. The church can also be of assistance in encouraging a greater degree of self-subsistence and more diversification.

Since the problem of land conservation is basically a matter of attitude, it is also a problem of inward desire. The best of land can become a rural slum where there is no desire for anything better. On the basis of years of research and experimentation, done by the college of agriculture, the experiment stations, the Soil Conservation Service, and various other public agencies interested in conservation, we have the "know-how" to rebuild and enrich our soils. But the "know-how" without an inward compulsion to use our information is ineffective. Most farmers know that rows on the contour prevent erosion and improve crop yields, but many now still run the rows up and down the hill. We have the problem of creating the desire to exercise our stewardship through the practical application of that which we know. And in the final analysis, it is the farmers who must restore and conserve our soil resources. Unless farm people believe that life on the land is worth preserving, they do not have this inward compulsion to save the soil. If we who live on the land despise our calling, if we are continually hankering after the fleshpots of the city, if we do not have the opportunity for a decent and wholesome life, if we do not see the social significance of our labors and the possibilities they afford for becoming fellow-workers with God, we will not be good stewards and the fruits of our abuse and exploitation of the soil will make us despise rural life even more.

Therefore, the church and all other agencies concerned with rural reconstruction must be interested in every effort to improve the quality of living among rural people and to assist rural people to appreciate the values inherent in their way of life. The church, in cooperation with other agencies which help form public opinion, can help nonfarm people to recognize the importance of the farmer in our modern, industrial society. The farmer will recognize his social responsibilities to the degree in which society recognizes his social significance. And if farm people are to believe that life on the land is good, they must have adequate rural institutions and facilities. A poor rural school is as much a symptom of erosion as a huge gully. Inadequate educational opportunity is a contributing cause, as well as a result, of erosion, for it detracts from the desire of rural people to maintain the land. How can we expect people to treat the soil as a trust for coming generations, when the children of the present generation are the victims of an inadequate educational system? The same is true of poor churches, poor roads, lack of electric power, and modern plumbing and other home conveniences: They all create dissatisfaction with rural life. These latter are material concerns but they have an important part to play in determining the attitude of people on the land.

I consider the problem of rural health and medical care. In a report to a senate committee some weeks ago, Charles F. Brannan, Assistant Secretary of Agriculture, summarized some startling facts which debunk the common idea that rural people are the healthiest citizens. Rural health care is about 40 years behind the times, and this is especially important when we realize that rural areas are the seedbed of future population. While a little over 40 percent of our population live in rural areas, over 50 percent of our children under 15 years of age live on farms. Fifty-three out of every one hundred farm boys of 18 and 19 who came up for the draft were rejected for physical defects. This was 40 percent higher than that of all other population groups. The death rate of mothers in childbirth is a third higher on farms than in

cities. The death rate of babies is a fourth higher. Typhoid fever claims three times as many farm as city victims. Despite the fact that 43 percent of the population is rural, only 18 percent of the doctors are in rural localities. The same is true of hospitals, and yet there are usually empty beds in rural hospitals. In 1941 the average city family spent $26 for medical care. The average farm family spent only $14. In the face of these facts, can we expect farm people to feel that life on the land is good?

Substitute good schools, active churches, all-year roads, electrification, more adequate medical care and recreational opportunities, better housing, and these, combined with a recognition of the values of rural living, can go far in making farm people feel that their way of life is good and in creating the desire to preserve that way of life for their children's children. The church, especially in rural areas, should help safeguard and strengthen the values inherent in rural life. Two of these we have already mentioned; man's moral relationship to the earth as the steward of the Eternal, and the dignity of ownership. Other similar values included: The primacy of the family, the significance of mutual helpfulness and cooperative effort as concrete channels for the expression of the Christian spirit of love, the contribution of the small community, the dignity of the rural vocation where labor has intrinsic as well as instrumental value, and the possibility of an integral life.

* * *

I would like to share with you the account of what one rural church has done to contribute to the local task of rural reconstruction. This church is located in a small, isolated, disadvantaged community on the Cumberland Plateau in East Tennessee. The land is not of the best originally, although it responds to proper use. Markets are remote. Incomes are secured from farms, timber, "public works," and allotments of various kinds. Practically all the families live on land which they own or are buying, and from which they win their subsistence. Much of the land remains to be cleared.

From 1917 until 1934, the development of the community was inspired and guided by a resident woman community worker. The church was organized in 1921, and was served by an absentee pastor until 1934, when the present pastor moved to the community. During these twenty-odd years some progress has been made toward the development of a Christian community, though there have been many disappointments, failures, and shortcomings. This goal of Christian community is a fleeting one and much remains to be done. But I would like to describe some of the indications of movement in the direction of the goal.

There was no church building in the community in 1934. The public schoolhouse was used for worship and for other services and activities. Believing that every community should have a house of worship and that worship of God is the care of Christian community, the first efforts of the new pastor and his fellow workers were given to the building of a beautiful, appropriate, functional church plant. Since the average cash income of the families was less than $100 per year, the money for the building was provided by an interested friend. But the work was done largely by voluntary labor, under the supervision of the pastor. Construction was started in October 1934, and the building was dedicated May 30, 1935. This building, constructed by loving hands of plain country folk, became not only a house of worship which stands as a silent symbol of God's presence in the midst of His human children, but also provided facilities for an enlarged church and community program, and was evidence of the power of togetherness and cooperation, even among a "poor" people.

At the time the church was built, a church farm, or potential farm, of 23 acres was purchased. Some of this has been developed and serves as a means for supplementing the minister's income, affords him a means of larger identification with his people, makes possible some simple demonstrations in good land use and in improved farming methods.

A recreational program for youth, which has been one of the major elements of the church program, developed slowly in the face of many difficulties: Prejudice, puritanical religion, opposition of neighboring preachers. Recreation is not used as "bait" but is provided, not adequately even yet, in response to a basic need of youth and as a contribution to the satisfaction of rural living. A house of play was planned and construction started when the war came and the sudden loss of manpower made volunteer labor impossible.

This community is 14 miles from the nearest town and doctor. A few years ago one call from a doctor cost the families from $15 to $25. This

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was a large percentage of the average annual cash income of many families, so a doctor was called only as a final recourse and often too late to be of any benefit. The minister spent a considerable portion of his time taking people to the doctor. The problem of health and medical care was tragic. The Church of the Great Physician could not pass by on the other side. So with the help of the mission board, a resident nurse was secured and a health program inaugurated in 1938. The community, again working under the direction of the pastor, erected a house of health which serves the dual purpose of residence for the nurse and a clinic center. The work of the nurse was largely in the homes, with an occasional emergency cared for at the center. A monthly mother-and-well-baby clinic was held, preventive measures and health education were emphasized, school health examinations made by the county public health service were followed up with corrective measures. A loan fund for medical care was established. Since January 1943 this program has been discontinued because nurses could not be found, but will be resumed later. Plans are under way for the construction of a modern county hospital in the county seat with outlying clinic centers, of which the house of health will be one.

Behind so many of the problems of this small community was the economic problem, the need for larger incomes resulting from improved use of local resources. In the winter of 1937–38 a farmers' school was conducted at the church, bringing in experts who told the farmers what to do. This was a poor educational procedure and little benefit came from the effort. In 1938, the minister and some of the leaders "discovered" Nova Scotia and learned what had been accomplished there by fishermen, miners, and farmers, whose economic situation was very similar to that locally. Through study-for-action, progress had been made in the solution of many of their problems. It was decided that this might offer a technique for finding the means whereby some of the pressing problems of their community could be solved. So in the winter of 1938–39 study clubs were organized, and continued each winter thereafter until the war. Neighbors met together to study their common problems and to seek their solution through concrete and united action. Experts were brought in to help answer the farmers' questions. Individuals developed, farm practices were greatly improved, and some cooperative enterprises were developed.

One of the latter, the Farmers Association, has made and is making a valuable contribution to economic improvement by making available the services of machinery which the individual farmers are unable to own. This association now owns and operates a considerable list of tools, including a tractor, sawmill, small thresher. And as soon as available, additional tools will be purchased.

In 1940, in response to the need for providing an economic opportunity for some of the older boys, and with the conviction that the land provides the best foundation for a Christian home, a church homestead project was inaugurated. This project, administered by local leaders, purchases farm or undeveloped land and sells to young families on a long term payment plan, with every possible safeguard for the homesteader and his family. To date 25 individuals or families have been assisted in the purchase of land, and 11 have completed their payments. Additional loans have been made for home and farm improvements. A community forest has been established and an addition made to the church farm. Additional land is held for future farms, and money, accumulated through payments, is available for future purchases.

A community shop has been constructed, and will be equipped with the proper tools when available. A woodworking project is under way with the assistance of a specialist from the college of agriculture. An electric line is forthcoming. In 1943 the community was selected as an area demonstration in soil conservation. This was the fruition of years of cooperation with the public agricultural agencies. As a part of this project a community organization has been set up and definite goals for community improvement are chosen each year, and monthly meetings are held looking toward the realization of these goals. A hot lunch program in the public school has been sponsored.

Along with the activities, the traditional church program has been maintained. World vision has been emphasized. Every opportunity to bring visitors from other races and nations to the community is welcomed. Church leaders cooperate in county and regional affairs. In these ways one rural church has tried to make its contribution to rural reconstruction.

Rural reconstruction, as is that of our total civilization, is basically a religious problem, a problem of values. Mere manipulation of man's environment is not enough. Knowledge of the

physical bases for the good life is not enough. The use which we make of our knowledge and of the power it places in our hands is the essential thing. Human values must determine our use of knowledge and our social arrangements, if civilization is to be saved. To what purpose do we save the soil, unless with it we save men, unless man's relationship to a restored, fertile soil contributes to personality and community?

If rural life, in America and in the world, is to be reconstructed, we all must, in cooperation with God, do the rebuilding. Each of us must share in the great redemption, city-dweller and countryman alike. Rural reconstruction can be accomplished only as we see ourselves as tenants of the Almighty and "as time writes on the face of the earth our care of the land and in our own faces our care of each other."

Three things must man possess,
If his soul would live and know life's perfect good—
Three things would the all-supplying Father give—
Bread, Beauty, and Brotherhood.

—*Edwin Markham.*

When we acknowledge, all of us, that we are tenants of the Almighty, keepers of the Holy Earth, brothers one of another, then will the land become what God intended, a garden in which man by and through his labor accepts these three essential gifts: Bread, Beauty, and Brotherhood.

SOYBEANS AND SOIL CONSERVATION

(Continued from page 54)

root system during the favorable growing season in early fall.

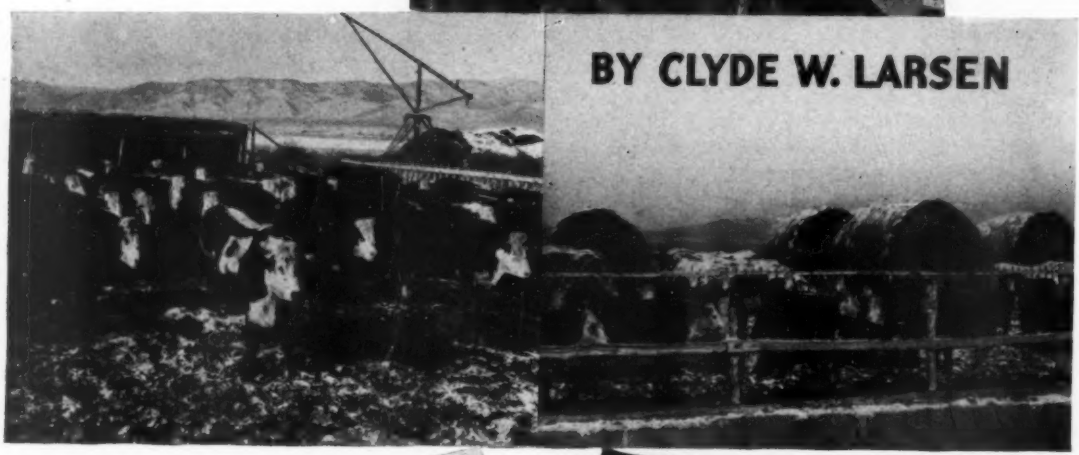
Erosion may be reduced further and more fertility saved by delaying the preparation of the land and the planting of the soybean crop a week or more in the spring. At this time of year, the growth of the hay or cover crop is very rapid, and the increase in organic matter may be measured in hundreds of pounds for every day that plowing is delayed. Additional savings of soil and fertility may be made by drilling the soybeans in 8-inch rows instead of 42-inch cultivated rows. Contouring is recommended for all sloping land whether the beans are drilled solid or planted in 42-inch rows and cultivated.

From these runoff and soil-loss data it is obvious that by returning the leaves, stems, and pods of the soybean plants to the soil surface a large saving of soil and water will result. The soil loss from land where the soybean hay was removed and the land left bare was 129 times as great as where it was mulched with 2 tons of wheat straw. By removing only the soybean seed and leaving all the leaves, stems, roots, and pods on the land, more than half of the nitrogen contained in the soybean is returned, and erosion is also markedly lessened.

IN colonial times the strength of the British Navy depended upon the old maids of England. The old maids kept cats, the cats ate mice, there were fewer mice to disturb bumblebees' nests, more bumblebees caused better pollination of red clover, more red clover seed made better pastures, and better pastures produced better beef to feed the sailors of His Majesty's Navy. This quaint illustration exemplifies the kind of thinking without which we cannot use our land most wisely, for our relationship to the land is complex. The disturbance of a single element in the land's complex relationships may be disastrous if we do not know what we are doing.—*Edward H. Graham.*

THEY MADE A *Master Plan*

BY CLYDE W. LARSEN



BETTER cattle weights, from 3 to 4 extra tons of sugar beets per acre, and a grain yield increase of 6 bushels per acre are the immediate results seen from conservation on the Johnson brothers' farm at Aurora, Utah.

The Johnsons already were applying most of the recommended conservation practices at the time their farm plan was made.

Willard Johnson first established himself in Aurora, a small farming community now in the Sevier County Soil Conservation District. His operations were on a modest scale. But when his three sons grew up they pooled their capital, reorganized and expanded operations. The Johnsons now follow a farm and range plan that is outstanding in its approach to the land capabilities and deficiencies of the area.

As additional acreage was purchased, the Johnson brothers found that soil fertility was badly depleted, that the fields were in need of leveling, and that the irrigation system needed reorganizing. With the formation of the Sevier County Soil Conservation District, the Johnson brothers saw a chance for help with their projected improvements. A farm plan was worked out with the help of Soil Conservation Service technicians which covered 416 acres of irrigated land and 402 acres of range land.

The maintenance and improvement of the fertility of their cropland was the first problem the Johnson brothers tackled. First, they applied phosphate to the alfalfa fields; immediately there were increases in plant growth and yields. Next, they varied the amount of phosphate applied per acre, and found that 200 pounds was the most economical amount to apply, with alfalfa selling at $15 a ton. It was noted that phosphate applied to the alfalfa would increase the yields of small grains and sugar beets the first year the fields were planted in these crops. This increase in yield was not obtained from the alfalfa fields that had not received applications of phosphate. The Johnson brothers decided that if phosphorous would increase the production of grain and sugar beets as they followed in the rotation, a phosphorous deficiency still existed in the soil.

In order to alleviate the deficiency further, the Johnson brothers drilled 150 pounds of phosphate per acre into the grain fields at planting time and side-dressed the sugar beets, using 150 pounds per acre. They discovered that the application of 75 pounds per acre to the beet crop following thinning, and an application of 75 pounds more at the last cultivation of the summer, gave better results than one application. These applications increased the small grain yields from 14 to 20 bushels per acre and the sugar beets from 3 to 4 tons per acre.

But the cropping plan was only part of the scientific management invoked. The Johnson brothers have gradually increased their grazing privileges on the range surrounding their farm until they can run 300 head of cattle. These cattle are allowed to graze on the range from April 20 to October 1, and have to be taken care of on the farm and private range the rest of the year. It was soon decided that steers would fit into the program better than mixed range cattle. At present spring calves are bought the following fall, placed in the feed yards and fed alfalfa hay until it is time to turn them out on the range. These calves are weighed in the spring and again at round-up time when the steers are driven to the farms. The steers are now graded according to size and condition, and placed in the proper feedyard.

The fattening ration consists of alfalfa, corn, wheat, oats, barley, molasses, and sugar beets. After corn is included in the crop rotation of the farm, corn silage will be used in the feed rations.

Last winter, 10,000 bushels of grain, 700 tons of hay, 600 tons of beet pulp, 30 tons of molasses, and a carload of cottonseed pellets were fed. When the steers are first placed on feed, the chopped grain is mixed with the beet pulp, making it impossible for the better feeders to founder from getting too much grain at one time.

Barnyard manure produced in the feed yards

(Continued on page 70)

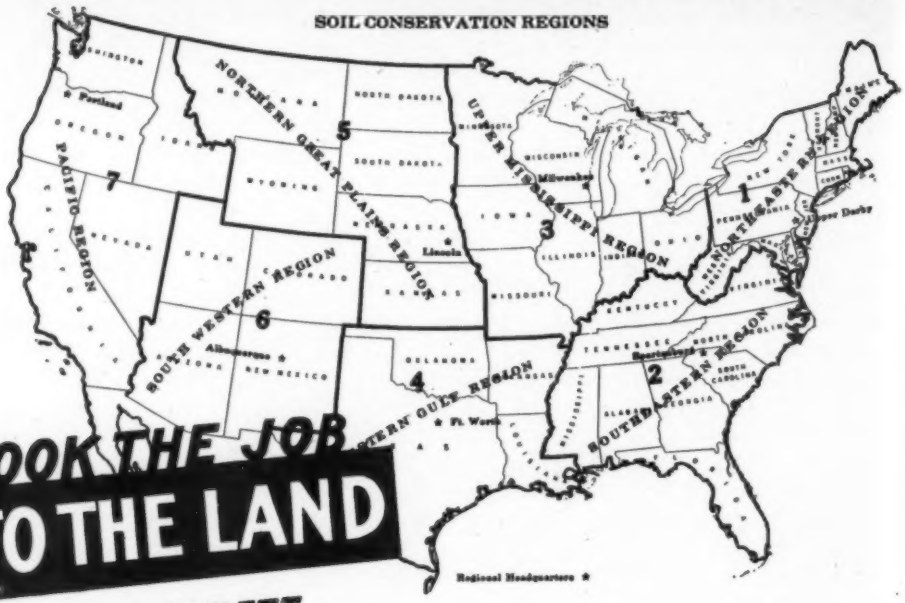
NOTE.—The author is work unit conservationist, Sevier County Soil Conservation District, Salina, Utah.

THE PICTURES

Johnsons all: left to right—Floyd, a district supervisor; Lloyd, W. R., Vernon and son.

Stock in this feed yard were sold 5 days after being finished on beet pulp, alfalfa, beet molasses, and grain mixture.
At the right is another view of the Johnson brothers' feed yards.

Cattle are fed in a sheetmetal-lined trough in this Johnson yard at North Aurora, Utah.
The farm has installed these two types of headgates. That at the left has an 8-inch drop and a lip in the apron. The other is for a larger ditch.



WE TOOK THE JOB OUT TO THE LAND

BY HUGH BENNETT

FOR 10 YEARS the Soil Conservation Service has operated on a regional basis. The Service has become recognized as an efficient agency; it has gained a reputation at home and abroad for getting the job done fast and well, and Soil Conservation Service procedures are now being used by various other agencies and by a considerable number of foreign countries.

Early in the life of the Service it was decided, for various reasons, not to undertake to do the whole job from Washington. Not that Washington was a bad place to work or anything of that sort, but because the erosion problem is very widely spread about the country and must be solved on the farm.

Accordingly, as much of the work as possible was moved out as close to the land as possible—out where the farmers and ranchers who use the land live.

When I was asked to take charge of a Nation-wide program of soil erosion control, I immediately made up my mind on several points that I considered fundamental. These were along the following lines: We would headquarter in Washington; we would send our specialists out through the country to work with farmers cooperatively; we would treat the land according to its capability (the way the land was made) and its needs (as determined by what man had done to the land); we would carry out a unified rather than a haphazard, piecemeal type of program, indiscriminately applied to the land; and we would check at timely intervals on the effectiveness of the field work by sending out inspectors capable of appraising the job being done for the farmers.

When we started the work in September 1933, I knew on the basis of 30 years spent in studying the lands of America and other countries that we could not possibly succeed except by treating the land according to its capability and needs. That was predetermined by the natural order of things. So, it was decided in the very beginning—and we still adhere to that decision—that we would work as well as we could along with nature, and not against her. And above all, we would not undertake to do the job by inviting farmers into a comfortable room to tell them what to do back on

their farms. Our specialists were told to go out on a farmer's land along with the farmer himself and there decide, cooperatively with him, what could and should be done in each of his fields, each pasture, woodlot, gully, and on every acre of idle land and all other land on the farm in order to conserve soil and water. This was done by going carefully over the entire farm, deciding what conservation work needed to be done on the basis of the degree of erosion, the slope, and the kind of soil, and then drawing up a plan for carrying out a complete and properly integrated soil conservation job on the entire farm.

We could never have achieved the tremendously successful soil-conservation accomplishments of the Service if we had not started in this manner, which combines the scientific basis with a practical approach. And we, of course, recognized the necessity of using the accumulated knowledge of science and practice gained around the world through research and farmer experience.

In doing these things we developed the fundamentally sound procedure of moving as much of the Washington office as practicable out to the land—out to the problem we were asked to solve. This move—this decentralization from Washington—has served the Nation in good stead. The job could not have been successfully done—as it is being done—in any other way.

So regional offices were established in appropriate parts of the Nation. Capable representatives were selected and assigned to the regional tasks of helping the Service get the work done efficiently, expeditiously, and according to the capability and needs of the land. Applicable protective measures were duly coordinated to meet the requirements of the land, the climate, and type of agriculture, as well as could be done within the economic limitations of the farmer, his market opportunities, his inclination, and his working facilities.

Many things I have asked these regional representatives of our headquarters office in Washington to do for the Service out there on the land—pretty nearly every activity we felt was practical to move out of Washington. I told our regional heads that, from time to time, I would send out from my office in Washington other widely experienced representatives, and would also go out myself, in order to check on the work in sufficient detail to satisfy myself that we were doing the best possible job.

There were, of course, additional reasons for this decentralization and method of inspection. For example, we had to account for every penny of money turned over to us by the Government. We had to satisfy the General Accounting Office that what we spent was used in accordance with the laws of Congress and the regulations of the General Accounting Office. We had to abide by the regulations of the Treasury Department of the United States and the rules and procedures of other departments. There were no lump sums of money to do with as we pleased—to spend when, where, and how we chose, without the responsibility of accounting for every cent turned over to us for the specific purposes of doing soil conservation under the guidance and authority of the Soil Conservation Act, Public Law No. 46, 1935.

There were numerous other reasons as to why it was highly advantageous, as well as absolutely necessary, to decentralize as completely as practicable. There were, for example, the exacting requirements of accounting, keeping property records, directing travel, determining needs for purchase of supplies, purchasing facilitating supplies, maintaining leave and retirement records, and looking after many other procedures involved with the activities of the Service and its cooperative relations with other agencies (the Soil Conservation Service now has some 1,920 cooperative agreements with other agencies).

It would not have been at all possible to take care of the required needs for the entire Service's accounting in Washington without hiring a force of accountants and bookkeepers that likely would have been looked upon as top-heavy. And it was well understood that limitations on expenditures and personnel could be imposed by the authorities, such as might easily have made it impossible to keep track of everything an agency of the nature of the Soil Conservation Service is required to account for.

Moreover, it would have been impossible to carry on the most effective type of work, if every move had to be directly controlled by officials at Washington headquarters. There would have been too much waiting and other loss of time. In order to get things done promptly, it was necessary to have our workers stationed close to the job they were appointed to carry out. This was peculiarly necessary in the coordinated type of work program the Service was conducting, under which specialists in various branches had to acquaint themselves with each other's specialty

so that they could work together and perform a completely balanced conservation job on the many kinds of land that make up farms, watersheds, and regions. The specialists charged with conducting the program to a *successful end* not only had to work very closely together but had to make their respective skills fit in with, and lend support to, the conservation measures applied to the land by other specialists. Separately, they could do a piecemeal, unbalanced, and unsuccessful job, such as characterized so much work on the land preceding the inception of the program of the Soil Conservation Service. Working together, they were able to do a well-rounded, properly adjusted, efficient job.

With the regional office set-up there has been much saving on travel and time. All of our employees were duly instructed not to waste a nickel—that before we would waste so much as 5 cents we would turn the funds back into the Treasury. This I also told the Congress of the United States. (See hearings on the agricultural appropriations bill for the fiscal year 1938, House of Representatives, 75th Cong., 1st sess., p. 1064.)

It was proposed at an early stage of the Service's life by a number of earnest people who came to see me that we should ask for an allotment of $125,000,000 a year for the soil conservation job. We probably could have obtained such an allotment, but my expressed wish was that the Service be given a smaller sum for its operations, because it was felt that with a considerably smaller allotment we could do at that time a more technically sound and fully effective job. I knew there were not available then enough well-trained, capable soil conservationists in the country to carry out a good, scientifically applied, conservation program, such as it was my unalterable determination to do, on a too extended scale. What I asked for was $25,000,000. (I recall also that some of the newspapers got hold of this obstinacy on my part and referred to it as the extraordinary behavior of a peculiar variety of bureaucrat.)

Of necessity, headquarters had to be maintained in Washington. It was vitally necessary, for example, to keep continuously in close contact with such agencies as the General Accounting Office, Treasury Department, Department of the Interior, Department of Agriculture, and the Bureau of the Budget. And we had to be prepared to appear at a moment's notice before congressional committees in connection with appropriations for soil conservation and with proposed legislation dealing with such varied subjects as flood control, water facilities, wildlife, and land use.

It was necessary to have other kinds of offices, also, due to the tremendous expansion of demands of soil conservation work throughout the country and out on our island possessions. State offices and later on, following the establishment of soil conservation districts, district offices had to be established, through which our main job of helping the districts is carried on. Congress tells us to serve the soil conservation districts. The districts are "out there" on the land, and therefore most of our technicians must be "out there" too—not in Washington or in some other central place remote from field, haylot, and pasture.

In setting up State offices to help with the Nation-wide soil conservation program, based on local, regional, and national land, climatic, and agricultural characteristics, it was necessary somehow to avoid the danger of having a multiplicity of local programs grow up in the county. That could easily have come about and it could easily have hurt or killed the entire national program. There probably would have been too many viewpoints—too much insistence by too many people that their own particular bailiwick called for its own particular program.

Soil erosion and the environmental features that govern proper land use and protection do not necessarily stop or change at State or any other artificial boundary lines, but they do stop or change in some degree at regional boundaries.

The United States is a big and complex country—too large, too variable for many to familiarize themselves quickly with all its numerous and widely scattered land problems and their solution. Somewhat like a doctor specializing in a particular branch of medicine, it is generally advisable, and often necessary, to have our young soil conservation technicians get acquainted with the problems of the country regionally. Even the problems of a region are sufficiently complex to call for persistent and energetic study on the part of our specialists in order for them to perform the required high-class scientific work that goes with their assignments to a given region. After they have fully mastered the intricacies of the erosion and water problems—which may take 5 years or more—they can be helpful utilized in other regions. But even under exceptionally favorable conditions—exceptional metality, experience,

energy, and love for the land and the work—our specialists are required to move up from the performance of relatively simple tasks to the more difficult operations; and at all times they need the close help and guidance of our more highly trained and experienced technicians.

Before we went into regionalization, tasks were repeatedly arising in various parts of the country that required much more expert attention than could be provided through the use of men whose experience was limited to relatively small portions of the country. Following the setting up of the regions, there was marked improvement almost overnight.

For the above and other reasons, it can be truthfully said that we were really forced into the establishment of regional offices. They have served the national program of soil and water conservation so splendidly—and continue to do so—that I am prepared now, after studying the erosion problem all over the country for 43 years, with 13 of the 43 years successfully devoted to the scientific and practicable solution of the problem, to say, without reservation, that the soil conservation problem cannot be solved without the use of regional offices. I mean exactly that: It cannot be solved in any other way. I am aware of the fact that some people will in all sincerity deny this. They do not know, as do we, that failure to develop a program adjusted to the character and needs of the land under the hundreds of different conditions existing throughout the country would have meant by this time confusion, piecemeal work, and eventual failure of the conservation movement.

Below are some of the reasons that the Service maintains its regional offices:

Regional administration reduces the cost.—The Soil Conservation Service employs many people; buys large quantities of equipment and supplies and keeps records of their use; rents offices, warehouses, and shops for repairing equipment; and performs many other similar functions. Long-time experience on the part of many private enterprises and such agencies as the War Department, Farm Credit Administration, Forest Service, and Federal Reserve System has demonstrated that personnel, fiscal, procurement, and related services can be handled at less cost through regional administration than on either a State or National basis. Handling such services on a national basis, from Washington or any other single point, would tend toward a slow, cumbersome organization. Handling them on a State basis would require the establishment of 48 duplicate administrative service units, which in the aggregate would greatly increase personnel and costs. Our regional offices handle a sufficiently large volume of work (pay rolls, purchases, rentals, services, etc.) to attain peak efficiency of operation without the development of top-heavy administration. For example, we have found that one qualified nursery chief can easily supervise the operation of several of the nurseries used for growing and distributing soil conservation seed and planting stock. In the 12 States included in our northeastern region (region 1) we employ only 7 persons in these nurseries to look after the work, as against a requisite personnel staff of 48 if exactly the same work were handled on a State basis. And our complicated map-making equipment which will print a farm map for one State will do the same thing for another, so that instead of providing 48 or more sets of such expensive equipment, along with the necessary highly trained operating staffs, we get along satisfactorily under the regional system with just 8 map-making set-ups, or one-sixth as many.

Regional administration maintains uniformly high technical standards of work.—In soil and water conservation there is no substitute for knowledge and technical excellence. Neither is there any simple remedy for the ills of the land that can be applied indiscriminately as a standardized treatment. There is as much variety in erosion as there is in the landscape, and the landscape is highly complex. Technical supervision of soil and water conservation work can be spread over several States with much greater efficiency from a central regional point, thus reducing cost of such services per State while maintaining a uniformly high standard of work quality from locality to locality and from State to State.

Our region 1 office, for example, is now employing 100 people, 35 of whom are technicians and 65 fiscal, procurement, personnel, and administrative (total personnel.) Total permanent employees, as of December 31, 1945, of the Service in region 1, outside the regional office was 618 including clerical help. In addition, there were on that date 199 temporary employees. Another agency in the Department, because of the character of its program, cannot operate any way *except* on a State basis. This agency as of December 31, 1945, re-

ported the employment of 494 persons at the State level of the eastern region (same 12 States as in region 1 of SCS), not including clerical help, 933 persons at the county level.

Regional administration provides balanced, comprehensively correlated action over large natural areas and watersheds.—By providing program direction on a regional basis, it becomes readily possible to plan and apply soil and water conservation operations effectively over large natural areas, such as watersheds. For example, work done in one part of a watershed may depend for its success on complementary or supplementary work in other parts of the area, regardless of intervening political boundaries. Thus with regional administration, soil conservation work on farms along part of a watershed in one State is not so likely to be nullified by the failure or tardiness of farmers to carry on supporting soil conservation work along the other part of the same watershed in an adjoining State; for under Soil Conservation Service methods, work programs are duly tied in from one region to another.

Regional administration provides for more rapid exchange and application of new ideas and scientific developments. The regional offices are not only equipped to evaluate conservation techniques, but also to disseminate rapidly to all farmers in the region adaptable new ideas and scientific developments for conserving soil and water. Our zone technicians, working throughout large areas, or zones, of essentially similar agricultural characteristics, are constantly reviewing, analyzing, and reporting on work progress and new developments. Thus, new techniques in one locality are made available promptly to all other localities where they may be serviceable.

Regional administration represents the national interest in soil and water resources.—The Nation, as well as the individual, the community, the county, and the State, has an interest—and an obligation—in the protection of our basic soil resource. Future as well as present generations have a stake in the land and most people now recognize that the present and future welfare of the Nation depends on the most careful use of our productive land at all times. Because the Nation has this interest—an inescapable obligation—it established the Soil Conservation Service and provided it with funds.

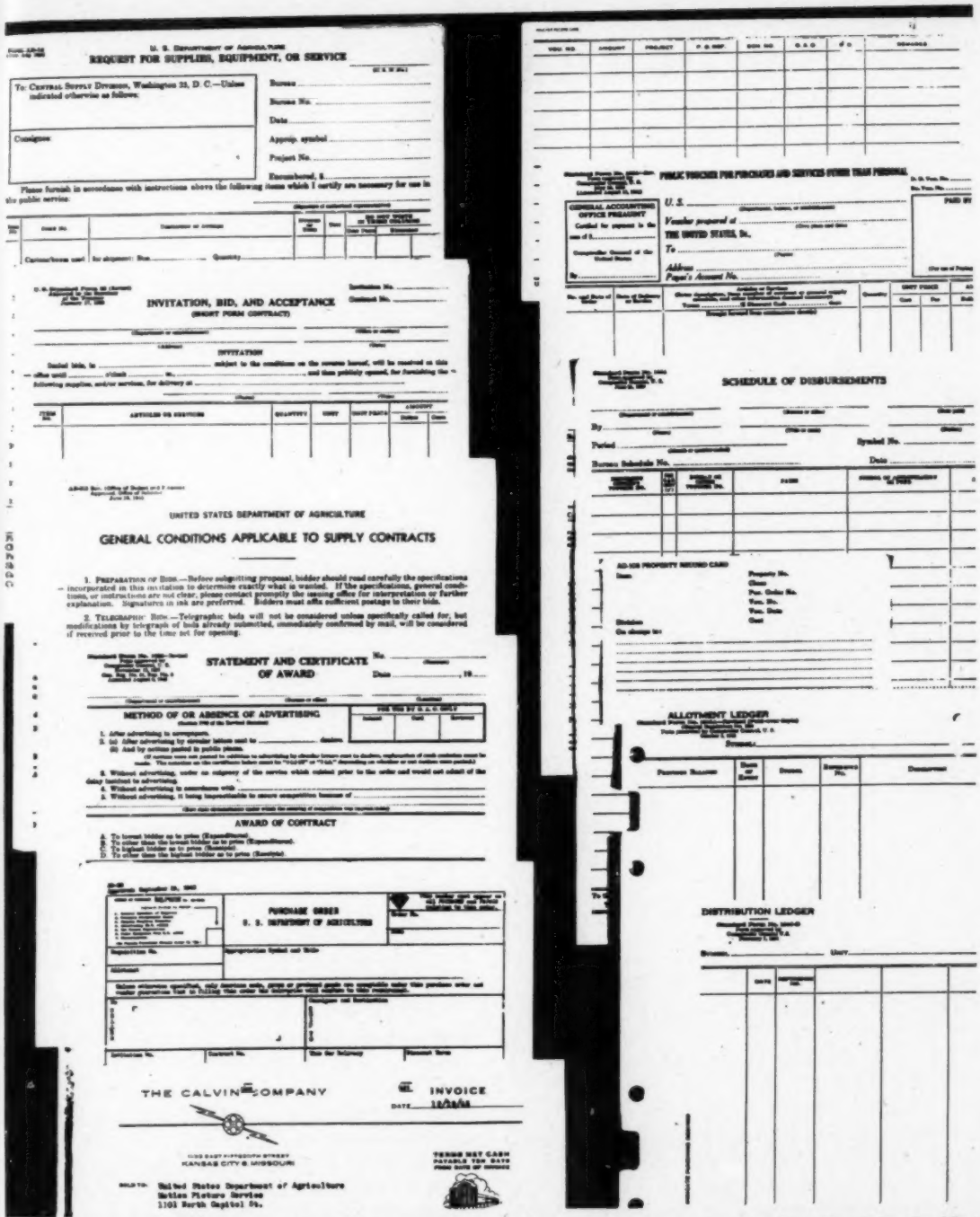
Example of many forms required to complete the purchase of a single item of the thousands of items required in getting the soil conservation job done.—An illustration of what is involved for the purchase of a single item, is given below:

Request for Supplies, Equipment, or Service.	Invoice.
Invitation, Bid, and Acceptance.	Voucher Record Card.
General Conditions Applicable to Supply Contracts.	Public Voucher for Purchases and Services Other Than Personal.
Statement and Certificate of Award.	Schedule of Disbursements.
Purchase order.	Property Record Card.
	Allotment Ledger.
	Distribution Ledger.

The completion and recording of these forms are concerned with but one of numerous transactions required in handling the complicated fiscal, purchasing, and property-accountability aspects of a large Government organization. The completion and posting of these 12 forms is normally required for nearly every purchase in excess of $100. For purchases involving smaller amounts only the execution of one of the 12 steps is eliminated. Besides the functions indicated, decisions have to be made by the purchasing officer, the auditor, the certifying officer, and accounting officer regarding the legality of the purchase, regulations of the General Accounting Office, the Department of Agriculture, and the Treasury Department, as well as our own Soil Conservation Service procedures. (People sometimes show impatience with such procedures—call it "red tape"—but it's a pretty thorough system of looking after public funds.)

The burden of details that would result from centralizing all such functions as illustrated above for the entire Service in one office would, among other things, lead to delays in getting needed materials and supplies out to the field, as well as delays in settlement of accounts. This would hinder the work of getting conservation on the land and probably would lead to ill-will on the part of establishments with which we do business. Centralization of similar required accounting, purchasing, etc., would require a staff as large or larger than we now have in the regional offices, and we would have less efficient administration.

On the other hand, if these detailed accounting, purchasing, and other similar activities should be required of each of the State offices, little or nothing would be gained and much would be added to costs of operation—the costs would probably be six times as much as at present. Moreover, expert accountants, purchasing officers, and similar clerical assistants are none too plentiful.


REQUEST FOR SUPPLIES, EQUIPMENT, OR SERVICE
INVITATION, BID, AND ACCEPTANCE
(SHORT FORM CONTRACT)
UNITED STATES DEPARTMENT OF AGRICULTURE
GENERAL CONDITIONS APPLICABLE TO SUPPLY CONTRACTS
STATEMENT AND CERTIFICATE OF AWARD
METHOD OF OR ABSENCE OF ADVERTISING
AWARD OF CONTRACT
PURCHASE ORDER
U. S. DEPARTMENT OF AGRICULTURE
THE CALVIN COMPANY
INVOICE
PUBLIC VOUCHER FOR PURCHASES AND SERVICES OTHER THAN PERSONAL
GENERAL ACCOUNTING OFFICE PREAUDIT
SCHEDULE OF DISBURSEMENTS
AD-105 PROPERTY RECORD CARD
ALLOTMENT LEDGER
DISTRIBUTION LEDGER

Here are 12 forms the Soil Conservation Service has to complete in order to buy a nonemergency item costing over $100. The rule, which SCS didn't make, calls for this—you can't get around it. There is no machine that will process such fiscal procedures; people who know how have to do the work. Considerable effort is involved but, after all, it's a pretty good system. So good, there seems little chance for waste or error in handling Uncle Sam's cash—not in the matter of the actual purchases, at any rate.

Northern Great Plains on the Air!

At least seven terracing demonstrations are scheduled for the Yankton area this year. Machinery is furnished by a local farm equipment dealer. This demonstration was part of the Nation-wide broadcast.

Richard Haeder, Wolsey farmer, and Ross D. Davies, State conservationist of the Soil Conservation Service, being interviewed. Haeder commented, "We can't afford to lose any farming units because of erosion."

A SATURDAY last spring, when radio director John Baker, U. S. Department of Agriculture, said, "That's all from Washington, today," the Nation-wide audience of the American farmer program was whisked across country to the Midwest, to a 160-acre farm in Yankton County, S. Dak. The event was a terracing demonstration on the farm belonging to Joe Yaggie, a cooperator with the Yankton County Soil Conservation District.

Again, the American Broadcasting Co. directed national attention to the soil and water conservation job being done in the Northern Great Plains.

Seven terracing demonstrations were scheduled near Yankton for 1946. Using equipment loaned by an implement manufacturer, farmers are shown how easily terraces can be constructed with ordinary farm equipment. During last spring's broadcast, the five-disc one-way plow was building terraces at the rate of 1,000 feet every 3½ hours.

In his opening remarks, Robert C. "Bob" White, ABC farm director, explained, "Joe Yaggie saw that conservation farming was the only way he had of protecting his rich James River bottomland. It was either save it, or go out of business.

"At this demonstration, the slope above a 40-acre cornfield is being terraced. The slope shows results of considerable erosion, and with the terraces established, runoff will be controlled. This will help stop the slope erosion, and will help protect the bottomland from wash-outs and silting."

Yaggie, who voted for the organization of the local soil conservation district and who was one of the first applicants for technical assistance, places great stock in conservation farming.

When queried about how be became interested in soil and water conservation, Yaggie answered,

Conservation progress on the Richard Haeder farmstead near Wolsey, S. Dak. Top picture taken during 1935 drought; bottom picture in 1943. "There are now 36,000 trees on my unit," says Haeder.

"I had been hearing and reading a lot about conservation farming and the results farmers were getting from it. I could see what was happening on this farm and knew that I had to do something. I went to Yankton and asked Howard Devick, work unit conservationist of the Soil Conservation Service, for help."

When asked if he received help, Yaggie answered, "You can bet I did. I worked out a complete farm conservation plan for 160 acres. This plan is one of the greatest things in the district set-up.

"By using terraces to help hold the water, I'm saving both water and soil," he told his Nationwide audience. "Grasses help me do that job. I plan to put at least half of my farm in grass and plant plenty of trees. And as part of my conservation plan, I'll practure pasture rotation, seed bromegrass, and contour farm."

At that moment, George German introduced Chris Mack, who was ready to take over with another interview. (Both German and Mack are farm directors at WNAX, Yankton.) Chris Mack interviewed Richard Haeder, who operates a farm near Wolsey, S. Dak. Haeder became nationally known through an article published in 1938 in a national magazine which described the erosion conditions on the old Karnstrum farm.

Haeder, who is a cooperator with the West Beadle Soil Conservation District and State President of the REA, related what has taken place on this unit since then.

"In the eyes of the insurance company, it was almost a lost unit," Haeder said. "At that time, we couldn't drive near the farmstead due to the drifts of dust and sand. There were only 6 tree stumps on the land. Today there are 36,000 trees. You have to drive into the farmyard to see the buildings."

Using conservation farming and his farm conservation plan as a basis for operation, Haeder has turned "hell's half acre" into a veritable para-

Joe Yaggie gets his entrance blank for the Greater South Dakota Association's agricultural achievement program from Howard B. Holmes, chairman of the organization's agricultural committee.

dise. After building up the soil for 4 years, 1938 to 1942, Haeder purchased the place from the insurance company.

"It's no longer that burnt-out spot," Haeder commented. "Although many people in the '30's said we could dump the unit in the ocean and not miss it, the results prove that we can't afford to throw any units away. With conservation farming, we can save every one of them."

When Ross Davies, State conservationist of the Soil Conservation Service, was interviewed during the broadcast, he evaluated the Haeder farm as being in the upper 5-percent of the farms in the State.

"And with one out of every 10 South Dakota units now being conservation farmed, more are on the way to agricultural stabilization," he said.

At the conclusion of the broadcast, Howard B. Holmes, chairman of the agricultural committee of the Great South Dakota Association made sure that Joe Yaggie received an application to enter the Association's Agricultural Achievement Program which is just being launched. More than $1,000 will be awarded to outstanding soil conservation districts and recognition plaques will be given to outstanding conservation farmers.

WNAX, long a proponent of soil and water conservation throughout its listening area, has been devoting considerable time to soil and water conservation programs.

Chris Mack said that the station recently inaugurated a half-hour Saturday evening broadcast specifically designed for conservation farming. Titled, "Land and Soil Conservation," the program is scheduled for 26 weeks and is cooperatively aired by extension directors from South Dakota and five adjoining States. WNAX also established a $42,000 scholarship fund for 4-H Clubs.

For their activity in the past year along lines similar to the conservation broadcasts, WNAX was given three radio awards in 1945. The station received the Alfred I. DuPont Award, the Variety Showmanship Award, and the American Public Relations Award.

"And for an announcement of a soil and water conservation job well done, keep your eyes and ears turned to the Midwest," was Mack's closing plug.

THEY MADE A MASTER PLAN

(Continued from page 61)

is spread over about 100 acres of cropland at the rate of 15 tons per acre. The manure is spread just before spring plowing by farm-owned manure spreaders and a tractor-loader built by Vernon Johnson. It is of interest to note that the Johnson brothers still find it incumbent to apply phosphorous to their farm land, even though barnyard manure applications cover the entire farm land every 3 years.

Inadequate spring range was another problem which the Johnson brothers faced when they started to expand their operations. After talking this problem over with Doyle Lund, district conservationist in the Aurora area, the Johnson brothers accepted his suggestion to seed 30 acres of the ranch on Loss Creek to an irrigated pasture mixture. This pasture was first grazed in the summer of 1945. It provided 160 cow-months of feed, taking considerable pressure off the early spring range. This was reflected in the average gain in weight of the steers as they increased from 275 pounds in 1944 to 350 pounds in 1945. Some of the gain undoubtedly traced to the fact that 1945 was a very good range year. Because of the good results from irrigated pastures, the Johnsons doubled their acreage in the spring of 1946

To find out whether there is a nitrogen deficiency in the soil, the district supervisors have requested Soil Conservation Service technicians to help the Johnsons in setting up observation tests in one of their best fields. This field will receive its usual allotment of barnyard manure before plowing, and ammonia nitrate fertilizer will be applied so that each strip can be harvested and weighed separately.

The district supervisors also suggested that the irrigation system be improved. The Johnsons are installing concrete turn-out gates at key points in this system. Forty-seven gates were installed in 1945. These turn-out gates will provide more positive control of the water and will facilitate its uniform application.

Minor drainage and alkali problems remain to be solved before the Johnsons will be satisfied. Leveling is being completed and a drainage study is being initiated.

Thus, a coordinated approach to the problems of managing farm and range land is being effected.

USE OF MINERAL FERTILIZERS

Dr. Emil Truog, professor of soils at the University of Wisconsin, evaluated the importance of organic matter in the soil at the Fifth Annual Conference on Conservation, Nutrition, and Health, at Ohio University, recently.

Dr. Truog said:

"Much ado is being made today about the great importance of soil organic matter in relation to soil fertility, soil conservation, and crops of satisfactory nutritive value. This, in part, is as it should be, because soil organic matter is of tremendous importance. It facilitates the intake of water and thus reduces runoff and erosion. It also favors workability or ease of cultivation, aeration, and drainage. Fresh organic matter contains all of the elements needed for plant growth, which, as decomposition proceeds, are released in forms suitable for new plant growth.

"However, to say that chemical fertilizers, such as superphosphate and muriate of potash should not be used to make up inevitable deficiencies of nutrient elements that cannot be supplied through the use of organic matter is just pure 'bunkum.' Absolutely no evidence exists to the effect that the judicious use of mineral fertilizers is at all injurious to soils, or tends to produce crops which are unsatisfactory as feed for animals or food for man. In fact, evidence, almost without end, now exists showing clearly that the use of mineral fertilizers on depleted soils promotes the growth of crops which have superior nutritive values.

"The fertility and organic matter content of gardens and other small areas may be maintained through the use of animal manure and composts. This use of composts is both feasible and commendable. However, when large areas are involved, as is the case in general farming, this practice is not feasible because of the impossibility of preparing and applying the enormous amounts of compost which would be needed. Fortunately, in general farming it is both convenient and profitable to follow a rotation of crops which provides the necessary organic matter in the form of crop residues (stubble, stalks, and roots) and animal manure produced in the feeding of crops. All that is required to make this system supply the needed organic matter is the proper use of lime, phosphate, and potash.

"It is sometimes said that 'nitrogen spells organic matter.' This means that liberal supplies of nitrogen promote such luxuriant growth that large additions of organic matter naturally follow. In the atmosphere over every acre of land, there exist in round numbers 35,000 tons of gaseous nitrogen. If these 35,000 tons of nitrogen were all transformed to a fixed (non-gaseous) form such as ammonium nitrate, the product would have a commercial value as fertilizer of over $5,000,000. How can the farmer draw upon this tremendous and inexhaustible supply of nitrogen? It is by growing legumes, which, when properly inoculated and fertilized, have the power of fixing atmospheric nitrogen which they can then use for the synthesis of proteins. Non-legumes, regardless of how grown, cannot utilize atmospheric nitrogen. They are dependent for nitrogen on that fixed by the legumes, or supplies in manure and commercial fertilizers."

INDIANA'S "WEEK"

Of the many special "weeks" devoted to worthy causes, few have exerted the permanent impact of Indiana's 1946 Soil Conservation Week.

Proclaimed by Governor Ralph F. Gates, who earnestly appealed to "all citizens, both rural and urban, privately and through their organizations, to protect and conserve the fertile fields of our fair State," the Week drew enthusiastic support from schools, churches, radio stations, clubs, theaters, and newspapers. There were demonstrations and tours conducted by county agents, district supervisors, vocational agriculture teachers, and Soil Conservation Service technicians. Much attention focussed on the educational and pioneering contributions of Indiana's Extension Service, in preparing the way for soil conservation on the farms.

The week, April 22–29, captured the interest of many persons not ordinarily reached by the soil conservation program, and whetted the desire of farmers in several counties to organize soil conservation districts of their own.

The high price of wives is impeding South Africa's soil conservation program, Dr. A. R. Saunders recently told a convention of British Empire scientists. The custom whereby young natives have to pay several heads of cattle for their brides has led, he said, to overstocking and overgrazing, with serious damage to native lands as a result.

REFERENCE LIST

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